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*Original Article*

Journal of Occupational Health and Epidemiology
Journal Homepage: https://johe.rums.ac.ir/
JOHE
Rafsanjan University of Medical Sciences

# Return to Work and Associated Factors among Workers with Stroke in Cotonou, Benin: A Cross-Sectional Study

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**Citation:** Mikponhoué Olou R, Houézé R, Allossogbe A, Adjobimey Vissoh M, Hountohotegbe E, Ayélo P, et al. Return to Work and Associated Factors among Workers with Stroke in Cotonou, Benin: A Cross-Sectional Study. J Occup Health Epidemiol. 2025;14(1):46-55.

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**Article Info**

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**Article history**
**Received:** Aug 2024
**Accepted:** Jan 2025

10. 61186/johe.14.1.46

**Print ISSN:** 2251-8096
**Online ISSN:** 2252-0902

Peer review under responsibility of Journal of Occupational Health and Epidemiology

**Abstract**

**Background:** Stroke is a major public health problem. One of the major stroke victims are workers, posing a real occupational health problem. The aim of this study was to determine the factors associated with return to work after stroke in Benin.
**Materials and Methods:** A cross-sectional study was carried out from May 30 to August 30, 2023 in the Neurology and Physical Medicine and Rehabilitation university clinics of the NUHC-HKM. It involved consenting stroke patients followed up in the two clinics from January 1, 2018 to December 31, 2022. Data were collected by means of a physical examination, a questionnaire and the calculation of various scores assessing the degree of disability. Statistical analysis was performed using R software. Logistic regression was performed, where the strength of associations was calculated using odds ratios. Statistical tests had a significance level of 5%.
**Results:** A total of 326 people participated in the study. There were 199 men (61%), presenting a sex ratio of 1.6. Just under half (48.8%) were administrative staff and the other half (51.2%) manual workers. More than half of the 144 respondents (56.6%) were self-employed. The average age at stroke was 49.8 + 9.6 years. Half of the patients (50%) had returned to work, with an average delay of 7.29 +7 months. Factors associated with reintegration included administrative employment (p=0.002), minor stroke (p<0.001), short hospital stay (p=0.002), and completion of post-stroke rehabilitation (p=0.039).
**Conclusion:** Post-stroke socio-professional reintegration is linked to clinical and professional factors. The absence of deficit disorders or the presence of minor deficit disorders facilitated the resumption of a professional activity. It is necessary to insist on the prevention of risk factors and to accompany self-employed workers in the care process.

**Keywords:** Stroke, Workers, Work, Benin.

## Introduction

Stroke is a major public health problem, described as a pandemic by the World Health Organization, which predicts a worldwide incidence of 23 million by 2030. Globally, one person suffers a stroke every 5 seconds [1].

In Benin, stroke is the most frequently hospitalized condition in the University Clinic of Neurology (CUN)



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at the National University Hospital Center-Hubert Koutoukou Maga (NUHC-HKM) in Cotonou [2]. This pathology, which used to mainly affect people over the age of 65, is now affecting younger people [3]. In sub-Saharan Africa, a quarter of all strokes involve people under 65, with an average age ranging from 44.5 to 61 [4]. These people are generally employed.

The clinical course of stroke can lead to survival with or without sequelae, or to immediate or delayed death; stroke is the leading cause of acquired disability in adults worldwide [5]. The frequency of these disabilities is estimated at 87% in Africa, 7 times higher than in developed countries [6]. Stroke management refers to a continuum of care, from emergency care through functional rehabilitation to return to work.

Work claims an essential role in society, and is the main route to social integration. It therefore plays a major role in self-fulfillment. Access to employment for people with disabilities remains highly complex. Sequelae, discrimination, limited access to services and lack of information are all factors which still greatly hamper the professional reintegration of disabled people [7].

The question of the professional future of workers who have suffered a stroke therefore arises at an early stage [8]. The time taken to return to work after a stroke, and the factors favoring this return, vary widely from one study to another. In Benin, no study has addressed the return-to-work aspect of professionally active stroke survivors. The aim of the present study is to examine post-stroke socio-professional reintegration and to identify factors favoring return to work.

## Materials and Methods

A descriptive and analytical cross-sectional study was conducted over a period of three months, from May 30, 2023, to August 30, 2023, at the NUHC-HKM in Cotonou, within two university neurology and physical medicine and rehabilitation clinics. It had included any worker aged at least 18 years who had survived a stroke and was managed in one of the two clinics during the period from January 1, 2018 to December 31, 2022. Patients meeting our inclusion criteria were contacted and, after obtaining their consent, were visited in consultation during the study period. All patients who withdrew their consent and those who could not be reached were excluded.

The variables under study associated with the dependent variable were as follows: returning to work and for the independent variables: socio-demographic data (age, gender, residence, level of education, marital status, ethnicity, religion, nationality), occupational data (job held, sector of activity, type of contract, job tenure, socio-professional category, presence of an occupational medicine department within the company), clinical data (type of stroke, location of brain lesions, time to treatment, risk factors, type of impairment, length of hospital stay, use of physiotherapy, length of rehabilitation, severity of stroke (NIHSS score), degree of disability (modified Rankin scale), functional autonomy (Barthel index), cognitive disorders (MMSE score), language disorders, motor disorders (RMI score), visual disorders, sphincter disorders), presence of anxiety and depressive disorders (HAD scale), presence of signs of fatigue (FAS score).

- Assessment of stroke severity using the NIHSS score [9]. The National Institute of Health Stroke Scale (NIHSS) is a scale that assesses neurological deficit and severity. It quantifies the severity of the deficit and has prognostic value. Stroke is defined as minor for a NIHSS score of 1 to 4, moderate for a NIHSS score of 5 to 15, severe for a NIHSS score of 15 or more, and serious for a NIHSS score of 20 or greater.
- Assessment of degree of disability using the modified Rankin scale [10]. The Modified Rankin Scale is a commonly used scale to measure the degree of disability or dependence in daily activities of people who have suffered a stroke. The score ranges from 0 to 6, where 6 is for death and 5 for severe disability (confined to bed, incontinent, constant nursing).
- Assessment of cognitive impairment using the Mini-Mental State Examination (MMSE) score [11]. This is a brief screening tool to provide a quantitative assessment of cognitive impairment and to record cognitive changes over time. The MMSE score briefly measures abilities in orientation in time and space, immediate recall, verbal short-term memory, calculation, language and constructive praxis. Note that the measure was originally used to detect dementia.
- Assessment of functional autonomy using the Barthel Index (BI) [12]. The BI assesses ten parameters: feeding, urinary continence, rectal continence, toilet use, personal care, bathing, dressing, transfer from bed to chair and vice versa, movement, stair use (going up and down stairs). The score is 10, 5, or 0 for an activity performed independently, with a little assistance, or with assistance dependence respectively. The IB is calculated by adding up the different scores obtained for each item. The lower the total score, the greater the disability. A maximum score of 100 indicates total independence. Certain threshold values are described as follows: a score of 20 corresponds to a degree of major dependence, while a score between 65 and 90 corresponds to functional autonomy enabling the patient to return home under satisfactory conditions.
- Assessment of motor disorders using the Rivermead Mobility Index (RMI) Score [13]. The RMI includes fifteen mobility items: 14 self-reported items and 1 item by direct observation (standing



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without support). The 15 items are organized hierarchically and meet Guttman's scale criteria, suggesting that all items are ranked according to increasing difficulty.

Each item is rated 0 or 1, depending on whether the patient is able to perform the task according to precise instructions. A score of 0 equals a negative response, while a score of 1 equals a positive response. A total score is determined by adding up the points allocated to all items. A maximum score of 15 is possible, with higher scores indicating better mobility.

- Hospital anxiety and depression scale (HAD) [14]. The HAD scale is a screening instrument for anxiety and depression disorders. It comprises 14 items rated from 0 to 3. Seven questions relate to anxiety (total A) and seven to depression (total D), thus giving two scores (maximum score for each = 21). To screen for anxiety and depressive symptoms, the following interpretation can be proposed for each of the scores (A and D):

  7 or less: no symptoms.

  8 to 10: doubtful or mild symptoms.

  nd over: definite symptomatology.
- Fatigue Assessment Scale (FAS) [15]. The Fatigue Assessment Scale (FAS) is a 10-item self-assessment scale for chronic fatigue symptoms. The FAS treats fatigue as a unidimensional concept and does not separate its measurement into different factors. However, to ensure that the scale assesses all aspects of fatigue, it measures both physical and mental symptoms.

The patient is asked to choose 5 responses ranging from 'never' to 'always'. (1. never, 2. sometimes (once a month or less frequently) 3. regularly (several times a month), 4. often (weekly) 5. Always (daily))

For the following items :

1. I suffer from signs of fatigue.
2. I get tired quickly.
3. I find that I don't do much during the day.
4. I have enough energy for everyday life.
5. I feel physically exhausted.
6. I have difficulty starting something.
7. I have trouble thinking clearly.
8. I don't feel like starting something.
9. I feel mentally tired.
10. When I'm busy doing something, I manage to stay focused.

Data collection included a review of the medical records of stroke patients followed up at the two university clinics who met our inclusion criteria. This enabled us to collect information on socio-demographic data and certain clinical data (date of stroke onset, medical history, time to brain imaging, type and location of stroke, initial NIHSS score, length of hospitalization, duration of functional rehabilitation). Respondents were then contacted for the next phase. This consisted of an interview and a physical examination. An evaluation of the various scores was carried out, and a questionnaire was submitted. We then asked them to answer the remaining questions on the survey form, particularly those relating to their return to work. Data analysis was performed using R software version 4.0.3.

To assess the association between the independent variables and socio-professional reintegration, a multivariate analysis was carried out. For multivariate analysis, an initial binary logistic regression model was developed, incorporating independent variables with a p-value of less than 0.20 in bivariate analysis. Then, a backward stepwise regression was performed to simplify this initial model by progressively removing non-statistically significant predictors. The association between the identified factors and the variable of interest was assessed using the odds ratio (OR) and its 95% confidence interval (CI95%). A significance threshold of 5% (p-value < 0.05) was employed.

## Results

**Socio-demographic and professional characteristics:** Of the 326 people surveyed, 199 were male (61%), with a sex ratio of 1.6. The mean age at stroke was 49.8 +9.6 years, with extremes of 19 and 75 years. Most of the respondents (292 or 89.6%) were educated, with 36.5% in secondary school and 31.3% in higher education. The sample was made up almost equally of “white-collar” administrative employees, 159 (48.8%) and “blue-collar” manual and self-employed workers, 51.2%. More than half of the 144 (56.6%) respondents were self-employed. Around 8 out of 10 patients (80.1%) had been working in the company for more than 10 years (Table 1).

**Table 1.** Socio-demographic and occupational characteristics of stroke workers followed up at NUHC-HKM from 2018 to 2022. n=326; 2023

| Variables | | n | % |
|---|---|---|---|
| **Education level** | No schooling | 34 | 10.4 |
| | Primary school | 71 | 21.8 |
| | Secondary school | 119 | 36.5 |
| | Higher school | 102 | 31.3 |
| **Marital status** | Married | 223 | 68.4 |
| | Common-law | 64 | 19.6 |
| | Widowed | 22 | 6.7 |
| | Single | 11 | 3.4 |
| | Divorced | 6 | 1.8 |



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| | | | |
|---|---|---|---|
| **Employment** | Administrative employees | 159 | 48.8 |
| | Sales representative | 92 | 28.2 |
| | Contractor/artisan | 75 | 23 |
| **Business sector** | Liberal | 184 | 56.4 |
| | Public | 94 | 28.8 |
| | Private | 48 | 14.7 |
| **Length of service** | <1 year | 2 | 0.6 |
| | 1-5 years | 27 | 8.3 |
| | 5-10 years | 36 | 11 |
| | >10years | 261 | 80.1 |

**Clinical characteristics:** A total of 326 patients were surveyed during the course of the study (Fig. 1).

**Stroke severity according to NHISS:** Stroke was severe in 23 people (7.1%) at entry. At the time of data collection, 56 (17.2%) no longer had any deficits. Half 166 (50.9%) had a minor stroke, a quarter 83 (25.5%) had a moderate stroke, and 21 people (6.4%) still had a severe stroke (Fig. 2).

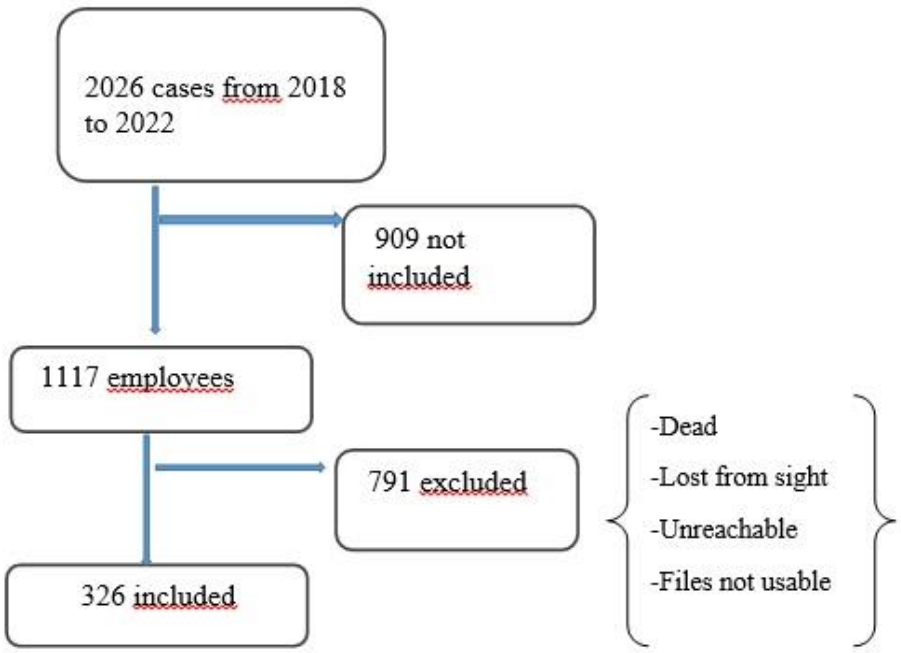


**Fig. 1.** Flow chart for inclusion of study respondents

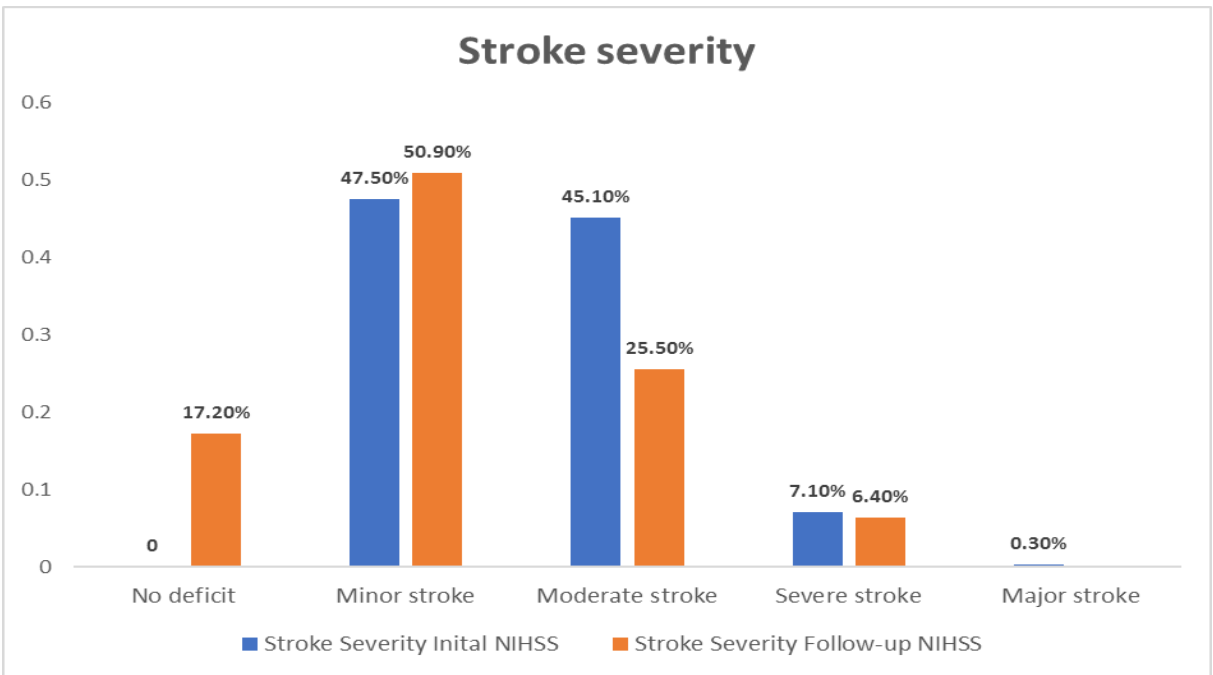


**Fig. 2.** Distribution of stroke patients followed at the NUHC-HKM from 2018 to 2022 according to the severity of the lesions at the time of the stroke and after the stroke. n=326; 2023.



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**Table 2.** Distribution of respondents according to language, visual, sphincter, motor, cognitive, anxiety, depressive disorders and signs of fatigue. n=326; 2023.

| Variables | | n | % |
|---|---|---|---|
| **Language disorders** | No | 246 | 75.5 |
| | Yes | 80 | 24.5 |
| | Dysarthria | 68 | 20.8 |
| | Aphasia | 12 | 3.7 |
| **Visual disorders** | No | 294 | 90.2 |
| | Yes | 32 | 9.8 |
| **Sphincteric disorders** | No | 316 | 96.9 |
| | Yes | 10 | 3.1 |
| **Motor disorders according to RMI score** | [11-14] | 166 | 50.9 |
| | [5-10] | 76 | 23.3 |
| | [1-4] | 28 | 8.6 |
| | None | 56 | 17.2 |
| **Cognitive impairment according to MMSE** | No | 257 | 78.8 |
| | Yes | 69 | 21.2 |
| **Anxiety disorders according to HAD** | No | 228 | 69.9 |
| | Yes | 98 | 30.1 |
| | Mild | 68 | 20.9 |
| | Certain | 30 | 9.3 |
| **Depressive disorders according to HAD** | No | 163 | 50 |
| | Yes | 163 | 50 |
| | Slight | 107 | 32.9 |
| | Certain | 56 | 17.1 |
| **Signs of fatigue according to FAS** | No | 14 | 4.3 |
| | Yes | 312 | 95.7 |
| | Sometimes | 200 | 61.4 |
| | Regularly | 79 | 24.2 |
| | Often | 29 | 8.9 |
| | Always | 4 | 1.2 |

**Post-stroke motor disorders, anxiety, depression and signs of fatigue:** In terms of sequelae, almost a quarter 80 (24.5%) had language disorders (including 3.7% aphasia and 20.8% dysarthria). Only 32 (9.8%) had a visual disorder and 10 (3.1%) sphincter disorders; motor disorders were present in 270 (82.8%). Cognitive and anxiety disorders were present in 69 (21.2%), 98 (30.1%) and 163 (50%) patients respectively.

Almost all 312 (95.7%) of those surveyed showed signs of fatigue, with more than half 200 (61.4%) experiencing it once a month (Table 2).

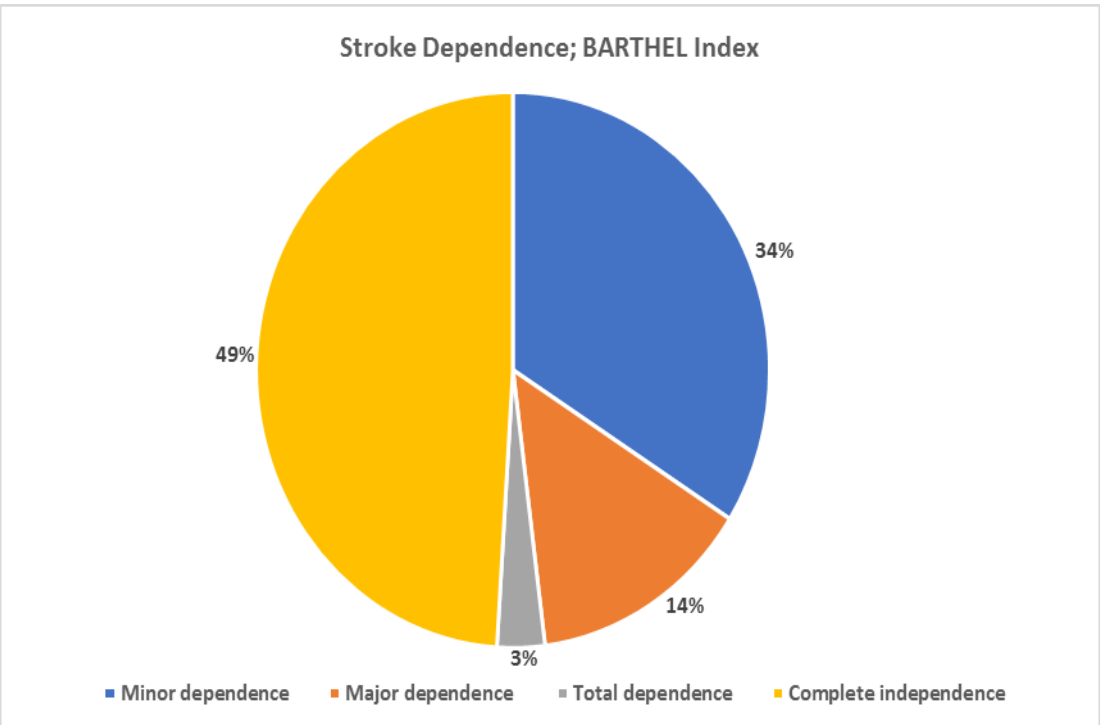


**Fig. 3.** Distribution of respondents according to degree of dependence for daily living activities according to Barthel index. n=326; 2023.



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**Daily dependence:** Half of the respondents (160 or 49%) were completely independent (Fig. 3).

**Return to work after stroke:** Of the 326 people surveyed, 163 (50%) had returned to work, with almost three-quarters (119, 73%) taking less than a year to do so. The average time to return to work was 7.29 months +/- 7 months.

Of those with severe stroke, only 7 had returned to work, and none of those with severe stroke had been able to return. The presence of disabling sequelae such as visual, cognitive, and sphincter disorders was the main reason why 131 people (81.4%) were unable to return to work (Table 3).

**Table 3.** Distribution of respondents according to return to work and associated parameters in workers monitored from 2018 to 2022. n=326; 2023.

| Variables | | n | % |
|---|---|---|---|
| **Resumption of professional activities** | No | 163 | 50 |
| | Yes | 163 | 50 |
| **Doctor's authorization before resuming work** | No | 109 | 66.9 |
| | Yes | 54 | 33.1 |
| **Time limit for returning to work date of stroke** | <1 year | 119 | 73 |
| | 1-2 years | 37 | 22.7 |
| | >2-5 years | 7 | 4.3 |
| **Return to previous job** | No | 23 | 14.1 |
| | Yes | 140 | 85.9 |
| **Change of job position** | No | 124 | 88.6 |
| | Yes | 16 | 11.4 |
| **Current position matches your profile** | No | 17 | 10.4 |
| | Yes | 146 | 89.6 |
| **Assessment of current position** | Suitable | 152 | 93.3 |
| | Unsuitable | 11 | 6.7 |
| **Reason for not returning to work** | Disabling after-effects | 131 | 80.4 |
| | Personal choice | 22 | 13.5 |
| | Redundancy | 8 | 4.9 |
| | Early retirement | 2 | 1.2 |

**Profile of patients who returned to work:** Respondents with a high level of education were more likely to be reintegrated than those with no education (OR= (4.8[2.12-11.4]), p<0.001) and respondents who were administrative employees were more likely to be reintegrated than those who were self-employed (OR= (2[1.2-3.41]), p=0.002). The clinical factors found to be related to the occupational status of workers with stroke were as follows: short hospital stay (OR= (0.1[0.0-0.40]), p<0.014); post-stroke functional rehabilitation (OR= (0.5[0.30-0.97]), p<0.042); minor stroke (OR= (6.1[2.46-16.8]), p<0.001); absence of deficit disorders or presence of minor deficit disorders such as motor (OR= (5.27[2.61-10.63]), p<0.001); language (OR= (5.9[3.32-11.2]), p<0.001); absence of visual disorders (OR=(3.34[1.45-7.69]), p=0.004); cognitive (OR=(2.59[1.48-4.56]), p<0.001), anxiety, depressive disorders, (OR= (0.14[0.07-0.26]), p<0.001); low degree of disability (OR= (6.1[2.04-26.5]), p=0.004); and low degree of dependence for activities of daily living (OR= (0.2[0.11-0.34]), p<0.001) (Table 4).

**Table 4**. Factors associated with return to work in stroke patients followed up at the NUHC. n=326; 2023.

| Variables | | Total | Socio-professional reintegration | | ORa | [$IC_{95\%}$] | p-value |
|---|---|---|---|---|---|---|---|
| | | | Yes (%) | No (%) | | | |
| **Initial severity NIHSS score** | Very severe stroke | 23 | 7 (4.3) | 16 (9.8) | 1 | | **<0.001** |
| | Severe stroke | 1 | 0 (0.0) | 1 (0.6) | | | |
| | Moderate stroke | 147 | 45 (27.6) | 102 (62.6) | 1.01 | [0.38 – 2.62] | |
| | Minor stroke | 155 | 111 (68.1) | 44 (27.0) | 2.35 | [1.25 – 4.39] | |
| **Presence of visual disturbances** | Yes | 32 | 8 (4.9) | 24 (14.7) | 1 | | **0.004** |
| | No | 294 | 155 (95.1) | 139 (85.3) | 3.34 | [1.45-7.69] | |
| **Presence of cognitive disorders according to MMSE score** | Yes | 69 | 22 (13.5) | 47 (28.8) | 1 | | **<0.001** |
| | No | 257 | 141 (86.5) | 116 (71.2) | 2.59 | [1.48-4.56] | |



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| **Degree of dependence (BARTHEL index)** | Total dependence | 9 | 0 (0.0) | 9 (5.5) | | | **<0.001** |
| | Complete dependence | 158 | 127 (79.9) | 31 (19.0) | 60.09 | [17.50-313.70] | |
| | Major dependence | 47 | 3 (1.18) | 44 (27.0) | 1 | | |
| | Minor dependence | 112 | 33 (20.2) | 79 (48.5) | 6.12 | [1.77-21.13] | |
| **Occupation** | Merchant/Retailer | 92 | 39 (23.9) | 53 (32.5) | 1 | | **0.002** |
| | Entrepreneur/Artisan | 75 | 29 (17.8) | 46 (28.2) | 0.85 | [0.46-1.59] | |
| | Administrative job | 159 | 95 (58.3) | 64 (39.8) | 2.01 | [1.19-3.96] | |
| **Length of hospitalization** | >3 months | 3 | 1 (0.6) | 2 (1.2) | 1 | | **0.003** |
| | 1-3 months | 13 | 1 (0.6) | 12 (7.4) | 0.16 | [0.01-3.88] | |
| | < 1 month | 310 | 161 (98.8) | 149 (91.4) | 2.16 | [0.19-24.08] | |
| **Presence of motor disorders according to RMI score** | Severe | 28 | 3 (1.8) | 25 (15.3) | 1 | | **<0.001** |
| | Moderate | 76 | 10 (6.1) | 66 (40.5) | 1.26 | [0.32-4.96] | |
| | Mild | 166 | 105 (64.4) | 61 (37.4) | 14.35 | [4.15-49.49] | |
| | None | 56 | 45 (27.6) | 11 (6.7) | 34.09 | [8.68-133.70] | |
| **Presence of language disorders** | Yes | 80 | 16 (9.8) | 64 (39.3) | 1 | | **<0.001** |
| | No | 246 | 147 (90.2) | 99 (60.7) | 5.93 | [3.24-10.87] | |
| **Presence of anxiety and depressive disorders (HAD scale)** | Certain | 86 | 16 (9.8) | 70 (42.9) | 1 | | **<0.001** |
| | Doubtful | 175 | 90 (55.2) | 85 (52,1) | 4.63 | [2.49-8.60] | |
| | Absent | 64 | 57 (35.0) | 8 (4.9) | 31.17 | [12.45-78.45] | |
| **Presence of signs of fatigue (FAS score)** | Yes | 312 | 152 (93.3) | 160 (98.2) | 1 | | **0.024** |
| | No | 14 | 11 (6.7) | 3 (1.8) | 3.86 | [1.06-14.10] | |
| **Degree of disability at time of study according to mRS score** | Severe disability | 18 | 2 (1.2) | 56 (34.4) | 1 | | **<0.001** |
| | Moderate disability | 43 | 4 (2.5) | 52 (31.9) | 2.15 | [0.37-12.26] | |
| | Mild disability | 76 | 24 (14.7) | 39 (23.9) | 17.23 | [3.84-77.16] | |
| | No significant disability | 189 | 133 (81.6) | 16 (9.8) | 232.8 | [51.79-1046] | |

## Discussion

The aim of our study was to determine the rate of return to work and the factors associated with return to work in workers who had suffered a stroke in Benin. A total of 326 workers were included. They were followed up at the NUHC-HKM in Cotonou, the national reference hospital. The return-to-work rate was 50%, where the factors that enabled return to work were young age, minor or moderate stroke according to the NHISS score, short hospital stay, early functional rehabilitation, and administrative employment.

The fact that the study took place in Cotonou and in a public hospital is likely to have introduced a recruitment bias and a risk of under-representativeness, as the patients came from urban areas, making us miss data from rural areas and the private hospital sector. However, the exhaustive nature of inclusion in our study and the fact that the NUHC-HKM is the national reference hospital enabled us to minimize these various biases so as to make our results relevant.

Socio-demographic characteristics: The mean age at stroke onset was 49.8 + 9.6 years, with extremes of 19 and 75 years. This average is close to that identified in previous studies in Benin, i.e. 49.4 [16]. Data from the sub-Saharan African literature point in the same direction, demonstrating the early onset of stroke [4,17]. This finding may be linked to the fact that the selected population is made up of workers, and that the retirement age in Benin's public administration is set between 55 and 60; it may also be linked to the youth of Benin's general population, or finally to the low prevention of risk factors. In our country, as in most developing countries, curative care takes precedence over prevention.

The study population was predominantly male, with a sex ratio of 1.6, in line with other studies carried out in Benin and France [16,18]. This may well be explained by the fact that, generally speaking, men are more active in the workplace than women. Further, in women, estrogen is thought to have a positive effect on cerebral



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circulation, an effect which seems to cease at menopause [19]. It could therefore be that young women are better protected from stroke than young men.

Employment and sector of activity: Among the paid workers in our sample, the informal liberal sector was the most represented at over half (56.4%), followed by the public sector at 28.8% and the private sector at 14.7%. Indeed, one of the pillars of the Beninese economy is the informal sector, with its two main components: small trades and re-export trade.

Small-scale trades and re-exporting are Benin's flagship activities, providing almost 80% of employment and contributing around 65% to GDP. Due to its importance, the informal sector sets the pace for national life and is the key to the security as well as well-being of the Beninese population [20].

Profile of reintegrated subjects

Clinical factors: The severity of injury at the time of stroke, as assessed by the initial NIHSS score, was significantly associated with return to work. Workers who had suffered a minor stroke had been able to return to work.

This is easily explained by the numerous disabilities associated with the severity of the stroke, which obviously impact socio-professional reintegration. Our findings are in line with most of the data in the literature [18,21,22]. Similarly, short hospital stays were associated with socio-professional reintegration. This finding is the same as in Cameroon [17]. Long hospital stays are generally linked to the severity of the stroke and the occurrence of complications.

Similarly, post-stroke rehabilitation has been shown to promote return to work. Indeed, it has been shown that employment rates following rehabilitation programs vary between 12% and 49% [23]. The importance of rehabilitation in the process of functional recovery is well established.

Furthermore, the presence of language, visual, sphincter, motor, and cognitive disorders influenced the return-to-work process. Individuals without language disorders were more likely to return to work than those with language disorders; the same was true for those without visual, sphincter, and motor disorders.

Those with no or mild motor disorders were more reintegrated than those with moderate or severe motor disorders. Respondents with no cognitive disorders were more likely to be reintegrated into the workforce than those with cognitive disorders. Several studies concur with our findings, and have identified a significant relationship between deficits and occupational recovery [17,24,25].

Doucet et al. in France, as well as Boubayi et al. in Congo, did not identify any significance with motor deficit disorders in their studies [18,26].

The association between the presence of cognitive disorders has been agreed upon by several authors, and is considered a positive predictive factor in some studies [18,27].

Our results can be explained by the fact that the main reason given by our respondents for not returning to work was the presence of disabling sequelae. Indeed, these impairments would limit not only travel to the workplace, but also professional performance.

Finally, depression and anxiety have a strong influence on mental health, and were also negatively associated with the chances of returning to work, more specifically the importance of returning to work on subjective well-being and life satisfaction. The presence of signs of fatigue reduces the chances of returning to work. Fatigue affects physical, psychosocial, and cognitive functioning. It affects participation in rehabilitation and limits recovery capacity.

The degree of disability at the time of the study, as assessed by the mRS score, was strongly associated with socio-professional reintegration, as was the degree of dependence for daily activities according to the Barthel index.

Several studies have indicated that impairment in activities of daily living was an important determinant of return to work in stroke patients [28]. Similar studies have found similar results [17,21,29,30]. Indeed, the more independent the patient is on activities of daily living, the easier it would be for him or her to return to work.

On the job front: In terms of employment, the majority of those reintegrated were “white-collar” administrative employees. Doucet et al. in France identified a higher rate of return to work among white-collar workers than among blue-collar workers [18]. The same observation was made in Japan, Thailand, and Sweden [5,21,31]. In Cameroon, on the other hand, recovery was higher among manual workers, and significant with job seniority [17].

Our results could be explained by the fact that white-collar workers are more rigorously monitored administratively in terms of the sick leave period to be respected, unlike self-employed workers who are more often left to their own devices.

Workers' post-stroke professional situation: Half (50%) of those surveyed were able to return to work after their stroke. Our results are close to those reported in countries such as Cameroon, India, and Japan, where return to work rates ranged from 41% to 55% [17,21,32]. It is better than those found in Congo (17.85%) and Senegal (32%), while being lower than those observed in Sweden, Korea, and China, where respectively 74.5%, 75.1%, and 79.41% of patients returned to work after stroke [33-35].

However, our result is superimposed on the average rate of return to work after stroke, which was 44% according to a literature review of 78 articles representing 8810 patients of working age, evaluated up to 27 years after stroke [36].



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This wide variation in return-to-work rates can be explained by differences in design and settings including variations in inclusion criteria, age categories used, duration of follow-up, and definition of work from one study to another.

The mean time to return to work was approximately 7.29 months. Our results differ from those found in Sweden, France, and Congo, which were 11.9 months, 19.2 months, and 2.44 months respectively [5,18,26].

Our results are similar to those observed in Senegal, where 92.3% of patients had returned to the same job and 7,7% had benefited from a change of position [24]. Resumption of work should be conditional on a return-to-work visit by the occupational physician, but in Africa, despite the legal obligation to have them, there is little availability of these physicians in companies. Not to mention the large proportion of self-employed workers who do not use the services of an occupational physician.

The study highlights the difficulties of returning to work after a disability in our context. These difficulties are linked to the absence of a policy of adaptation and reclassification of workstations, as well as to the lack of occupational physicians in public administrations or companies, and to the strong preponderance of the informal sector, which escapes all regulations and where social benefits are absent. Further, more extensive studies of other health facilities in urban and rural areas would be warranted in order to study the problem on a national scale.

## Conclusion

Resumption of work after a stroke in Benin is conditioned by clinical factors (stroke severity, presence or absence of motor, cognitive and anxiety disorders) and professional factors (administrative workers). Proper prevention of risk factors would help reduce the severity of stroke, and offer a better chance of returning to work. In addition, support measures for self-employed workers are needed to maintain their employment after an acquired disability.

## Acknowledgments

This article was taken from the PhD thesis in Medicine (Ange Allosogbe) from the University of Abomey -Calavi (Code 2624/2023). We would like to thank all individuals who participated in the study.

## Conflict of interest

None declared.

## Funding

We did not receive any external financial support for this study.

## Ethical Considerations

We obtained informed consent from the participants and authorization from the hospital management for data collection which was treated anonymously.

## Code of Ethics

The study was submitted to the ethics committee under number 008.CERSS/UAC and was registered under number N° 2624 at the Faculty of Health Sciences of the University of Abomey -Calavi.

## Authors' Contributions

Mikponhoué Olou Rose: Initiated this study and wrote the protocole and the manuscript; Houézé Richard: Initiated this study and wrote the protocole and the manuscript; Allossogbe Ange: Analyzed the data allosogbé collected the data; Adjobimey Vissoh Mênonli: Analyzed the data allosogbé collected the data; Hountohotegbe Esdras: Analyzed the data allosogbé collected the data; Ayélo Paul: Proofread the manuscript; Adjien Constant: Proofread the manuscript; Hinson Antoine Vikkey: Proofread the manuscript.

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